

THE CLAIMS

What is claimed is:

1. A light emitting assembly comprising a solid state device coupleable with a power supply constructed and arranged to power the solid state device to emit from the solid state device a first, relatively shorter wavelength radiation, and a down-converting luminophoric medium arranged in receiving relationship to said first, relatively shorter wavelength radiation, and which in exposure to said first, relatively shorter wavelength radiation, is excited to responsively emit radiation in the visible white light spectrum.
2. A light emitting assembly according to claim 1, wherein the solid state device and down-converting luminophoric medium are associated in a unitary structure.
3. A light emitting assembly according to claim 1, further comprising a housing member formed of a light-transmissive material, said housing member defining therewithin an interior volume, with said solid state device and down-converting luminophoric medium being disposed in said interior volume.
4. A light emitting assembly according to claim 3, further comprising first and second electrical contacts extending through said housing member and coupleable to a power supply which is constructed and arranged for imposing a voltage on said solid state device to induce emission of said first, relatively shorter wavelength radiation outside the visible white light spectrum.

5. A light emitting assembly according to claim 4, wherein said down-converting luminophoric medium is contiguously arranged in said interior volume of said housing in relation to said solid state device.

6. A light emitting assembly according to claim 4, wherein said down-converting luminophoric medium is arranged in spaced relation to said solid state device in said interior volume of said housing.

7. A light emitting assembly according to claim 1, wherein said solid state device comprises a device which is selected from the group consisting of semiconductor light emitting diodes, semiconductor lasers, thin film electroluminescent cells, electroluminescent display panels, organic based light-emitting diodes, polymeric-based light-emitting diodes, internal junction organic electroluminescent devices, and combinations thereof.

8. A light emitting assembly according to claim 1, wherein said solid state device comprises a device which is selected from the group consisting of semiconductor light emitting diodes and semiconductor lasers.

9. A light emitting assembly according to claim 1, wherein said solid state device comprises a semiconductor light emitting diode.

10. A light emitting assembly according to claim 1, wherein said solid state device comprises a semiconductor light emitting diode including a substrate and a multilayer device structure, and wherein said substrate comprises silicon carbide.

11. A light emitting assembly according to claim 1, wherein said solid state device comprises a semiconductor light emitting diode including a substrate and a multilayer

device structure, and wherein said substrate comprises a material selected from sapphire, SiC, and In Ga Al N.

12. A light emitting assembly according to claim 11, wherein said multilayer device structure includes layers selected from the group consisting of silicon carbide, aluminum nitride, gallium nitride, gallium phosphide, germanium carbide, indium nitride, and their mixtures and alloys.

13. A light emitting assembly according to claim 11, wherein said solid state device comprises a solid state semiconductor laser including an active material selected from the group consisting of III-V alloys and II-VI alloys.

14. A light emitting assembly according to claim 1, wherein said solid state device includes an ultraviolet light source and said down-converting luminophoric medium comprises a material selected from the group consisting of perylene tetracarboxylic diimide fluorescent dye; naphthalene tetracarboxylic diimide fluorescent dye; 9,10-bis(phenylethynyl) anthracene fluorescent dye; substituted 9,10-diphenylanthracene dyes; tetraphenylbutadiene (TPB) fluorescent dye.

15. A light emitting assembly according to claim 1, wherein said solid state device includes an ultraviolet light source and said down-converting luminophoric medium comprises a naphthalene tetracarboxylic diimide fluorescent dye, to provide blue light emission, and substituted perylene tetracarboxylic diimide dyes to provide green (or green-yellow) and red light emissions.

16. A light emitting assembly according to claim 1, wherein said solid state device includes a blue light source and said down-converting luminophoric medium comprises a

material selected from the group consisting of: a naphthalene tetracarboxylic diimide fluorescent dye, to provide greater luminosity of the color hue blue; a 9,10-diphenylanthracene, to provide greater luminosity of the color hue blue; a substituted 9,10-diphenylanthracene, to provide greater luminosity of the color hue blue; 1,1,4,4-tetraphenylbutadiene (TPB) to provide greater luminosity of the color hue blue; a perylenetetracarboxylic diimide to provide greater luminosity of the color hues green and red; a perylenetetracarboxylic diimide to provide greater luminosity of the color hue red, and 9,10-bis(phenylethynyl) anthracene to provide greater luminosity of the color hue green; and a perylenetetracarboxylic diimide to provide greater luminosity of the color hue red, and halogen-substituted 9,10-bis(phenylethynyl) anthracene to provide greater luminosity of the color hue green.

17. A light emitting assembly according to claim 1, wherein said down-converting luminophoric medium comprises a perylenetetracarboxylic diimide and a naphthalenetetracarboxylic diimide, and wherein each perylenetetracarboxylic diimide is formulated with a concentration between 10^{-3} and 5 mole percent, and wherein each naphthalenetetracarboxylic diimide is formulated with a concentration between 10^{-2} and 10 mole percent.

18. A light emitting assembly comprising a solid state device coupleable with a power supply constructed and arranged to power the solid state device to emit from the solid state device a first, relatively shorter wavelength radiation, and a down-converting luminophoric medium arranged in receiving relationship to said first, relatively shorter wavelength radiation, and which in exposure to said first, relatively shorter wavelength radiation, is excited to responsively emit second, relatively longer wavelength radiation.

19. A light emitting assembly according to claim 1, wherein said solid state device comprises a solid state LED.

20. A light emitting assembly according to claim 1, wherein said first, relatively shorter wavelength radiation is down converted to between one and three distinct and separable regions of red and/or green and/or blue light.

21. A light emitting assembly according to claim 1, wherein said first, relatively shorter wavelength radiation is down converted to between 2 and 10 distinct and separable regions of white light and light of the color hue red, green or blue light.

22. A liquid crystal display including a backlight member including a multiplicity of light emitting assemblies, each light emitting assembly comprising a solid state device coupleable with a power supply constructed and arranged to power the solid state device to emit from the solid state device a first, relatively shorter wavelength radiation, and a down-converting luminophoric medium arranged in receiving relationship to said first, relatively shorter wavelength radiation, and which in exposure to said first, relatively shorter wavelength radiation, is excited to responsively emit second, relatively longer wavelength radiation.

23. A display including a viewable panel including a multiplicity of light emitting assemblies, each light emitting assembly comprising a solid state device coupleable with a power supply constructed and arranged to power the solid state device to emit from the solid state device a first, relatively shorter wavelength radiation, and a down-converting luminophoric medium arranged in receiving relationship to said first, relatively shorter wavelength radiation, and which in exposure to said first, relatively shorter wavelength radiation, is excited to responsively emit second, relatively longer wavelength radiation.

24. A display according to claim 20, further comprising a user-responsive controller for selectively illuminating specific ones of said light emitting assemblies.